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FIG 1

The method may also include permitting air to escape from the head-shaped mould cavity by means of the other or second end of the handle member and/or by means of at least one air escape or vent passageway leading from the head-shaped mould cavity.

The method may further include preheating the head-shaped mould cavity to a temperature of between 25°C and 35°C prior to introducing the polymeric material into the mould cavity and/or maintaining the mould cavity at a temperature of at least 25°C, e.g. between 35°C and 100°C, for between 5 and 20 minutes after the polymeric material has been introduced thereto, to allow the material components to react and cure.

According to a second aspect of the invention, there is provided a hand tool for percussive use, which includes

a head of polymeric material; and  
a tubular handle member protruding from the head, with polymeric material extending from the head into the inside of the handle member.

The handle member may be of linear form, with its axial opening at one end located in the head so that the polymeric material extends into the handle member through said axial opening, at least one further aperture also being provided in the handle member in proximity to said axial opening with polymeric material also extending through this aperture. A grip portion or member may be provided around the other end of the handle member with the grip member also being of polymeric material and being connected to polymeric material inside the handle member by means of polymeric material passing through at least one aperture in the handle member at its said second end.

The hand tool may be made according to the method as hereinbefore described.

According to a third aspect of the invention, there is provided mould apparatus for moulding a hand tool for percussive use the apparatus comprising

a mould providing a head-shaped mould cavity;  
and

an opening leading into the mould cavity in which an elongate tubular handle member can be located.

The apparatus may include a filler opening for introducing settable polymeric material into the mould cavity.

The mould may comprise two complementary mould sections, each providing a portion of the mould cavity. The head-shaped mould cavity may be circular in cross-section. Each mould section hence comprises a portion of the head-shaped mould cavity, as well as an elongate secondary mould cavity extending transversely to said portion of the head-shaped mould cavity, the handle member, in use, being locatable in the secondary mould

cavity. The free end of the secondary cavity, is the end remote from the head-shaped mould cavity, may have an enlarged cross-sectional area so that, in use, a thickened grip member can be moulded around the free end of the handle member. This enlarged portion of the secondary mould cavity may be provided with hand-grip formations.

The invention will now be described by way of example with reference to the accompanying diagrammatic drawings.

In the drawings,

FIGURE 1 shows a three-dimensional view of mould apparatus according to the third aspect of the invention, with a handle member for use with the mould apparatus also being shown;

FIGURE 2 shows a three-dimensional view of a hand tool for percussive use, moulded in the apparatus of Figure 1.

In the drawings, reference numeral 10 generally indicates mould apparatus according to the third aspect of the invention.

The apparatus 10 comprises two mould sections 12, 14. Each section 12, 14 comprises a rectangular metal casing 16 containing a mould 18. Each mould 18 provides a portion 20 of a head-shaped mould cavity, as well as a portion 22 of a secondary cylindrical mould cavity. The portion 20, 22 are hemispherical in cross-section. At one end 24 of each of the portions 22, there is provided an enlarged hand-grip shaped portion 26, which is of greater cross-sectional area than the remainder of the portions 22. The mould surfaces of the portions 26 are provided with grip formations in the form of grooves 27.

The casings 16 are hingedly connected together by means of a hinge 28.

An elongate handle member 30 is also provided. The handle member 30 comprises a rigid circular section tube 32 having longitudinally and circumferentially spaced apertures 34, 36 in proximity to its ends 38, 40 respectively.

The mould 18 may be of metal, eg aluminium; polymeric material, eg castable resin; or the like.

In use, the end 38 of the handle member 30 is located in the portion 20 of the head-shaped mould cavity in one of the mould sections 12, 14. The ends 38, 40 of the handle member 30 can be precoated with a bonding agent, to enhance adhesion of the polymeric material, as described in more detail hereunder, thereto. The handle member 30 nestles in the portion 22 of the secondary mould cavity of that mould section, with its end 40 located within the mould cavity portion 26. The other mould section is pivoted to mate with the mould section in which the handle member is located. The mould apparatus 10 is then placed in a

shown) can be provided in the moulds 18, these passageways (which may be similar to, but of smaller cross-sectional area than the portion 22) leading upwardly from the portions 20, through the moulds 18, and through the casings 16.

Furthermore, the radius of the portion 22 can be increased so that an annular space or gap (not shown) around the member 30, extending from the portions 20 to the portion 26, is provided in each of the moulds 18. Polymeric material will hence also enter these spaces, resulting in the entire tube 22 being coated with polyurethane material. The remainder of the tube 22 will then also be precoated with the bonding agent so that the entire tube 22 can in this embodiment be precoated with the bonding agent.

Hence, with the hand tool 50 the problem of insufficient or insecure attachment of the head to the handle, resulting in the head being movable relative to the handle, eg about the axis of the handle, associated with known percussive tools and hence unsuitability of the tool for further use, is reduced or overcome. Further, with the hand tool 50, as well as with the hand tool 10 when its handle is of plastics material or graphite, the problem of sparks being generated in use is avoided, hence rendering these tools suitable for use in hazardous locations, eg in mines.

#### Claims

1. A method of making a hand tool for percussive use, characterized in that it includes locating a hollow elongate handle member in a head-shaped mould cavity so that a portion of the handle member protrudes from the cavity; introducing a settable polymeric material into the mould cavity and into the inside of the handle member; and allowing the material to set, thereby to form a head of the hand tool in the mould cavity with the handle member secured to the head by means of the polymeric material extending from the head into the handle member.

2. A method according to Claim 1, characterized in that the handle member is of rigid tubular form, with its one or first end located inside the mould cavity, sufficient material being introduced into the mould cavity so that the polymeric material extends up the handle member for at least half its length, with the material entering the handle member through its axial opening.

3. A method according to Claim 2, characterized in that it includes providing a plurality of apertures in a wall of the handle member in prox-

imity to its first end so that the polymeric material extends through these apertures, thereby to assist in securing the handle to the head.

4. A method according to Claim 2 or Claim 3, characterized in that it includes providing an elongate cylindrical grip-shaped mould cavity around the other or second end of the handle member as well as apertures in the wall of the handle member in proximity to its second end, with sufficient polymeric material being introduced into the head-shaped mould cavity and handle member so that some of the material also passes through these apertures into the cylindrical grip-shaped mould cavity, thereby to mould integrally with the handle member a thickened grip portion around the second end of the handle member.

5. A method according to Claim 4, characterized in that it includes providing an elongate sleeve-like mould cavity between the head-shaped and grip-shaped mould cavities, with the remainder of the handle member located with peripheral clearance in this cavity, with the sleeve-like mould cavity being in communication with the head-shaped mould cavity, and allowing polymeric material also to enter this annular space from the head-shaped mould cavity.

6. A method according to any one of Claims 2 to 5 inclusive, characterized in that it includes

(i) preheating the head-shaped mould cavity to a temperature of between 25°C and 35°C prior to introducing the polymeric material into the mould cavity and maintaining the mould cavity at a temperature of at least 25°C for between 5 and 20 minutes after the polymeric material has been introduced therein, to allow the material components to react and cure;

(ii) turning the mould cavity over, prior to firm setting of the polymeric material, to ensure that the settled material has a uniform density; and

(iii) permitting air to escape from the head-shaped mould cavity by means of the other end of the handle member.

7. A hand tool for percussive use, characterized in that it includes a head of polymeric material; and a tubular handle member protruding from the head, with polymeric material extending from the head into the inside of the handle member.

8. A hand tool according to Claim 7, characterized in that the handle member is of linear form, with its axial opening at one end located in the head so that polymeric material extends into the handle member through said axial opening, at least one further aperture being provided in the member in proximity to said axial opening with polymeric material also extending through this aperture.

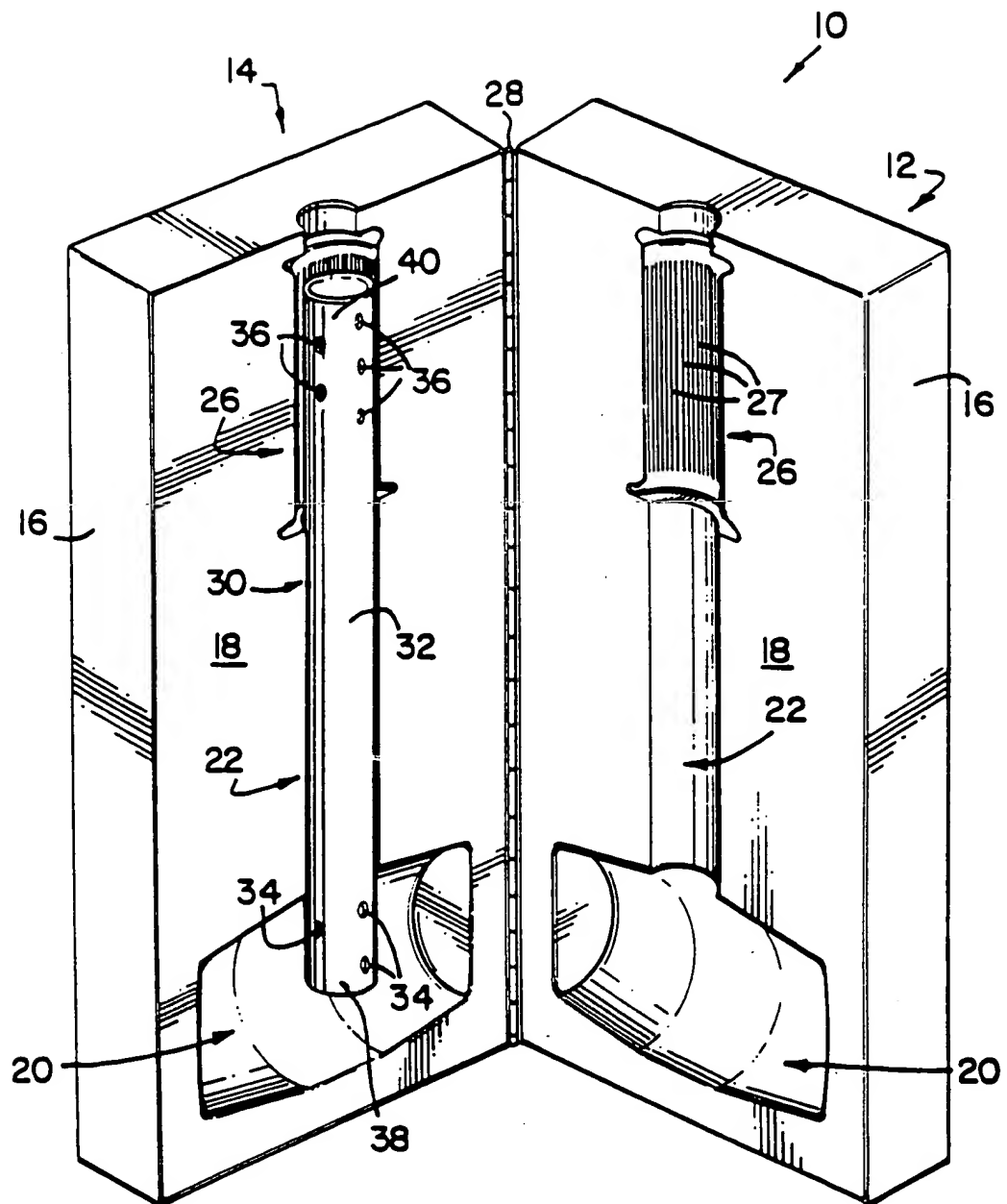


FIG 1

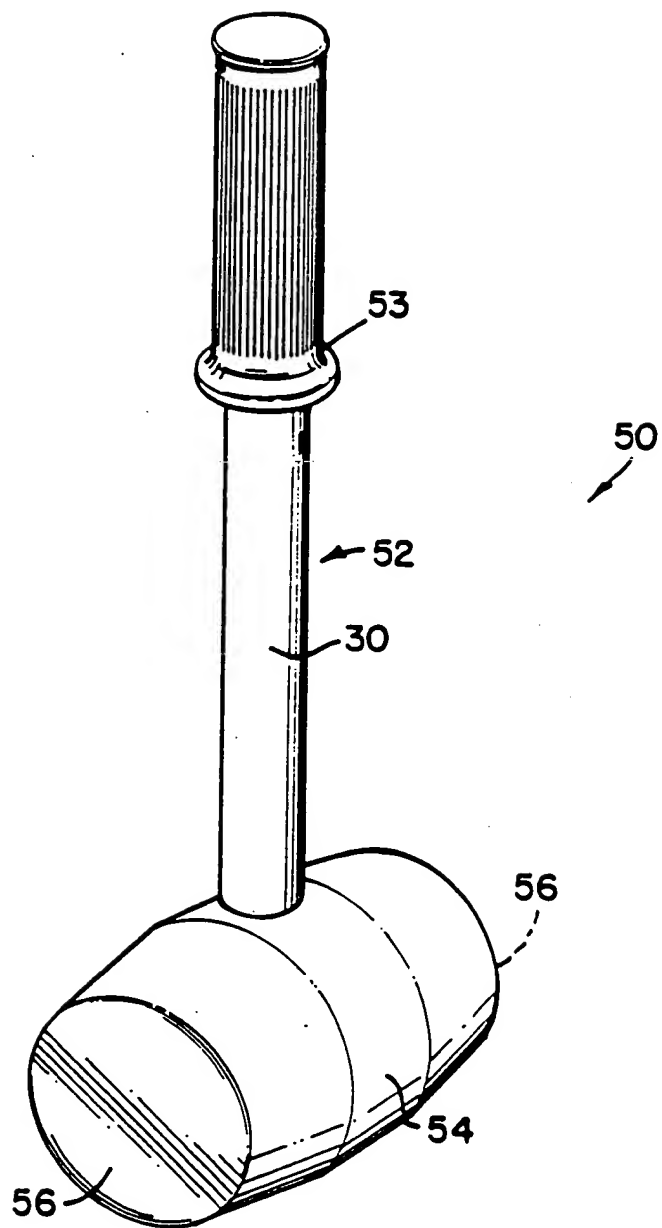


FIG 2